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VMWARE, INC. DARRYL SMITH 3145 PORTER DRIVE PALO ALTO, CA 94304			EXAMINER RECEK, JASON D	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/665,808

**Applicant(s)**

XU ET AL.

**Examiner**

Jason Recek

**Art Unit**

2109

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-48 is/are pending in the application.
- 4a) Of the above claim(s) 40-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-39 is/are rejected.
- 7) ☒ Claim(s) 1-39 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

- 4) ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

This is in response to the application filed on September 19<sup>th</sup> 2003 in which claims 1-48 are presented for examination.

#### ***Status of Claims***

Claims 1-39 are pending, of which claims 1, 15, 24, 30-31, and 38 are in independent form.

Claims 1-39 are currently objected to.

Claims 1-39 are currently rejected.

Claims 40-48 are withdrawn from consideration.

#### ***Election/Restrictions***

1. Applicant's election without traverse of Group 1 in the telephone conversation that occurred on April 30<sup>th</sup> 2007 is acknowledged.

Claims 40-48 are hereby withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply communicated on April 30<sup>th</sup> 2007.

#### ***Claim Objections***

2. Claim 1 is objected to because of the following informalities: The use of the word "determining" after comprising is unclear and not proper English. It is suggested that in

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order to make the claim clearer applicant describe the steps for determining in detail or use language similar to 'comprising the steps of: determining...'. Appropriate correction is required.

3. Claims 1-39 are objected to because of the following informalities: the acronym NIC is not defined or spelled out in the claims. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-14, 24-29, and 31-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "determining NIC management information related to possible NICs over which the data *may be* transferred" the term "may be" renders the claim indefinite because the preamble states the purpose of the method is to respond to a request to transfer data, however by using "may be" it is unclear whether the data will be transferred or not.

Claims 2-14 inherit the indefinite limitation from claim 1 and thus are also rejected.

Claim 24 recites, "may be routed". This phrase renders the claim indefinite because it is uncertain whether the data will be routed over any NIC even though the claim later recites "selecting a NIC over which to route the data". By using the phrase "may be routed" the claim also covers the situation where the data is not routed and thus the claim is indefinite whether the data is ever routed or not.

Claims 25-29 inherit the indefinite limitation from claim 24 and thus are also rejected.

Claim 31 recites, "the VM may attempt to transfer data". The language "may attempt" renders the claim indefinite. The claim is directed towards "a method for transferring data" but the words "may attempt to transfer" do not clearly state what the applicant is claiming, transferring data using the method described, or thinking about transferring data.

Claims 32-37 inherit the indefinite limitation from claim 31 and thus are also rejected.

Claim 38 is indefinite for the same reason as claim 31, it uses the phrase "may attempt" and because of this wording the claim does not clearly describe what the applicant is claiming as their invention.

Claim 39 is rejected because it depends from claim 38, which is also rejected.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 30 is rejected under 35 U.S.C. 102(e) as being anticipated by Macchiano et al. US. Pat. No. 7,111,303 B2.

Macchiano discloses, “a method for routing data between a virtual computer system and a computer network” as a way for users on a virtual machine to communicate using Internet Protocol (see column 3, lines 50-52). Macchiano further discloses, “the virtual computer system comprising a first VM and a second VM” as a virtual machine operating system having a first and second user portion (see column 3, lines 53-54, Fig. 1 components 12, 14; col. 4 lines 50-54). Macchiano also discloses, “the virtual computer system also comprising a first NIC and a second NIC for connecting to the computer network” as describing each user portion having a virtual NIC and the computer system may also contain multiple physical NICs (see col. 3 lines

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56-58 and Fig. 1 comp. 42, 44; col. 5 lines 4-6). Macchiano further discloses, "the method comprising: for each data transfer request: determining which VM within the virtual computer system is involved in the requested data transfer; and if the first VM is involved in the requested data transfer, routing the data over the first NIC; or if the second VM is involved in the requested data transfer, routing the data over the second NIC" as a way of communication in which a base portion maintains a table of IP addresses by which the device driver addresses its respective NIC (determining which VM is involved in transfer), and where the IP datagram from the first user portion is passed to the first NIC, alternatively, if the data is relating to the second user, the second NIC is used (see column 3, lines 60-66).

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-8, 10, 12, 15-16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam et al. US Pat. No. 6,208,616 B1 in view of Vega US Pat. No. 7,136,800 B1.

Regarding claim 1, Mahalingam discloses "based on the NIC management information [...] deciding whether to transfer the data" and "based on the NIC management information [...] selecting a NIC over which to transfer the data" as a

system that can perform load sharing of packets across a plurality of NICs by using NIC loads as a factor and switching between NICs if one fails (see abstract, paragraph 98, and Fig. 10). Mahalingam does not teach using VM-specific information in the decision making process. However Vega teaches making a decision “based on [...] the VM-specific information” by allocating resources among multiple virtual machines running on a physical computer. Vega explicitly teaches using VM-specific information (see paragraph 15, line 5) to manage the host computer's resources. Although Vega is directed to allocating processor time, one skilled in the art understands that a NIC is a computer resource and the same allocation methods can be used. Motivation to combine these references is common knowledge in the art. Using thread / process specific information (such as priority) is well known when allocating processor time in a multithreaded environment. Logical partitions are a natural extension of a multithreaded operating system, and thus using VM specific information to allocate resources would have been obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claim 2 the additional limitation, “in which the VM-specific information indicates an amount of network bandwidth that is allocated to a VM that requested the data transfer” is suggested by Vega as apportioning a percentage of resources to each virtual machine (see paragraph 9, lines 17-18), or in the alternative an absolute capacity (see paragraph 11, lines 1-2). The motivation to combine the two references was set out in the rejection of claim 1.



Regarding claim 3 the additional limitation, "decision is made not to transfer the data because transferring the data would cause the VM's allocation of network bandwidth to be exceeded" is suggested by Vega. Vega teaches that if a VM were to exceed its allocation of resources, the operation would not be allowed (see paragraph 17, lines 11-15). Motivation to combine is the same rationale as used in claim 1 rejection.

Regarding claim 4 the limitation, "in which the VM-specific information indicates the priority of the VM that requested the data transfer relative to the priorities of other virtual machines" is taught by Vega (see paragraph 11, lines 12-15) where priorities are assigned to VMs for the purpose of resource allocation. The motivation to combine these references follows the same rationale as used in claim 1 rejection.

Regarding claim 5 the limitation, "in which the NIC management information indicates the available NICs over which the data may be transferred" is disclosed by Mahalingam. The system in Mahalingam controls which NIC to use, to do this it is inherent that a list of available NICs is kept (see Fig. 2, steps 52-66). Motivation to combine is the same as that used in the claim 1 rejection.

Regarding claim 6, Mahalingam discloses the additional limitation "in which the NIC management information further indicates a pending data transfer load for each of the available NICs over which the data may be transferred" as a system that chooses

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which NICs to use based on an algorithm that includes load information (see column 15, lines 30-35). Motivation to combine is the same as that used in the claim 1 rejection.

Regarding claim 7, Mahalingam discloses “in which a load distribution function, based on the NIC management information [...] is used in selecting a NIC over which to transfer the data” as a system that chooses a NIC based on an algorithm that will choose a NIC that is less loaded than another NIC (see column 15, lines 30-35). The motivation to combine Mahalingam and Vega is the same as stated in the claim 1 rejection.

Regarding claim 8 the additional limitation, “in which a first VM’s data transfer requests are substantially always routed over a first NIC as long as the first NIC is available, and a second VM’s data transfer requests are substantially always routed over a second NIC as long as the second NIC is available, but the first VM’s data transfer requests are routed over the second NIC if the first NIC is not available, and the second VM’s data transfer requests are routed over the first NIC if the second NIC is not available” is disclosed by Mahalingam as a system having a primary and secondary NIC where traffic is directed to the primary NIC until it fails and thereafter traffic is directed to the remaining NIC. It would have been obvious to one of ordinary skill in the art at the time the invention was made to also switch from the secondary NIC to the primary NIC if the secondary NIC failed, this is just the mirror image of what was disclosed by Mahalingam.

Regarding claim 10, Mahalingam discloses "in which the management information indicates whether a failover is occurring on one of the NICs over which the data could otherwise have been transferred" as a system that detects NIC failures and determines which NIC to use based on this information (see column 4, lines 30-40). The motivation to combine Mahalingam and Vega is stated above.

Regarding claim 12 the further limitation "wherein, if a decision is made not to transfer the data, the data is place on a queue for transferring at a later time" would have been obvious to one of ordinary skill in the art at the time the invention was made. It is well known in the art that when an operation cannot or is not desired to be performed at the present moment, to put the information on a queue or waiting list so it can be acted upon at a later time.

Regarding claim 15, Vega discloses "a resource manager for sharing system resources between the plurality of VMs" as a scheduler that manages resources (see paragraph 14, last 5 lines). Mahalingam discloses "a NIC manager for routing data from the plurality of VMs through the plurality of NICs to the computer network" as a program module that includes instructions for routing data (see column 2, lines 48-51). These two managers are necessarily contained in a computer program and therefore meet the limitations of claim 15. It is also noted that the program functionality was set out in

claim 1 and the rationale for combining the references is similar to the rationale used in the rejection of claim 1.

Regarding claim 16 the references disclose “wherein the VM-specific information and the NIC management information are used together when making decisions”, as this limitation is contained in claim 1 by the words “based on the NIC management information and the VM-specific information, selecting ...” thus this claim is rejected under the same rationale as the claim 1 rejection.

Regarding claim 18, Vega clearly discloses “wherein the decisions regarding the sharing of system resources are based on a proportional-share approach” as a system for allocating resources based on a proportional share approach. Although the resource in Vega is the processor, this approach is easily adapted to share bandwidth as well (see abstract).

9. Claims 9 and 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam and Vega and further in view of Carollo et al. U.S. Pub 2004/0267866.

Regarding claim 9, Mahalingam and Vega do not disclose “in which the first VM’s data transfer requests are distinguished from the second VM’s data transfer requests by reference to a source physical address contained in a header of each data transfer request”, however Carollo teaches this as a system that connects virtual machines to a

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tangible network. Carollo describes a system where a VM can send and receive data specific to it, thus the data transfer request inherently must include an address to receive a response, this address allows one to distinguish between different VMs (see abstract and paragraph 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Carollo because a return address to distinguish the sender is a necessity for any type of two-way communication.

Regarding claim 24, Mahalingam discloses “determining a plurality of available NICs over which the data may be routed; and based on the [...] available NICs over which the data may be routed, selecting a NIC over which to route the data” as a system for load sharing between NICs. Mahalingam does not disclose “determining which VM within the virtual computer system is involved in the data transfer” however this is taught by Carollo as method for connecting VMs to a tangible network. In order to send and receive information a VM must have an address and thus when transferring data it is inherent that a determination is made which VM is involved. Vega discloses “based on the particular VM involved in the data transfer ... [selecting a NIC]” as a system for allocating resources to VMs. Although Vega deals with processor time, its teaching can easily be adapted to allocate network bandwidth. The motivation to combine these references has been stated above, therefore in view of the teachings of these three references, the method of claim 24 would have been obvious to one of ordinary skill in the art at the time the invention was made.

Regarding claim 25, Mahalingam expressly discloses “the selection of a NIC over which to route the data is further based on information regarding pending data loads on the available NICs over which the data may be routed” as a system that performs load sharing among multiple NICs (see column 15, lines 30-35).

Regarding claim 26, Vega discloses “wherein the selection of a NIC over which to route the data is further based on relative priorities for the plurality of VMs” as a system that selects what data to process based on relative priorities for different VMs (see paragraph 11, lines 12-13). The motivation for combining the allocation methods described in Vega with multiple NICs described in Mahalingam was set forth above.

Regarding claim 27, Vega discloses “selection [...] based on system resource allocations for the plurality of VMs” as a proportional share approach described earlier.

Regarding claim 28, Mahalingam discloses “selection of a NIC over which to route the data is based on a load distribution algorithm” as a system for load sharing, specifically several different algorithms to choose a NIC are described for the purposes of distributing the load (see column 10, lines 8-16).

Regarding claim 29, Mahalingam discloses “where the load distribution algorithm is a load-balancing algorithm” as an algorithm that uses a round-robin mechanism to choose NICs (see column 10, lines 8-16).

10. Claims 11, 13-14, and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam in view of Vega and further in view of Rietschote et al. U.S. Pat. No. 7,203,944 B1.

Regarding claim 11, Mahalingam and Vega do not disclose, "in which the VM that has requested the data transfer is temporarily suspended if a failover is occurring on one of the NICs over which the data could otherwise have been transferred". However Rietschote does teach suspending a virtual machine to balance load (see col. 1 lines 8-10 and col. 7 lines 4-5). The motivation to combine is load balancing which is apparent from the title of the invention. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to suspend the VM when a NIC was failing, this is simply a way of load balancing.

Regarding claim 13, Rietschote discloses "if a decision is made not to transfer the data, a further decision is made whether to suspend the VM that requested the data transfer" as a system that suspends VMs to balance the load. In the present invention it is assumed that when a decision is made not to transfer this is because the VM is exceeding its share of resources, thus an act of load balancing needs to occur. Rietschote teaches suspending the VM as a way of load balancing (see paragraph 24).

Regarding claim 14, Rietschote discloses, "a further decision is made whether to migrate the VM that requested the data transfer to another computer system" as a system for performing load balancing by migrating VMs from one computer system to another (see paragraph 21). The motivation for combining Rietschote is similar to the motivation set out in the claim 11 rejection.

Regarding claim 19, Mahalingam and Vega do not disclose "a VM manager for controlling the general operation of the plurality of VMs", however Rietschote does teach managing multiple virtual machines by using a virtual machine kernel (see column 3, lines 5-6). The motivation to combine Rietschote was set out in the rejection of claim 11 and the same motivation applies to the instant claim.

Regarding claim 20, taken together Vega and Mahalingam disclose using "the VM-specific information and the NIC management information [...] when making decisions regarding the management of the plurality of VM" and Rietschote specifically teaches using load monitoring (information) to manage VMs (see column 8, line 30). Motivation to combine these references has already been set forth and thus it would have been obvious to one of ordinary skill in the art to modify Mahalingam and Vega with the teachings of Rietschote.

Regarding claim 21, Rietschote discloses "wherein the VM manager and the resource manager are both implemented in a single software unit" as a kernel that is



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able to manage VMs as well as calculate load – a resource manager (see column 8, line 30 and column 10, lines 8-9).

Regarding claim 22, Rietschote discloses “wherein the VM manager, the resource manager [...] are integrated together within a kernel” however Rietschote does not teach integrating the NIC manager with the kernel. However Mahalingam discloses a NIC manager and in view of Vega it would have been obvious to one skill in the art to incorporate a NIC manager when more than one NIC is present. Just as Vega teaches a resource manager, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a NIC manager into the kernel, just as the scheduler for the processor is included in the kernel (see Fig. 1 of Rietschote), if the resource is NICs it would be natural to put the NIC manager in the kernel as well.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam in view of Vega and in further view of Bly et al. US Pub2004/0032830 A1.

Neither Mahalingam nor Vega disclose, “wherein the decisions regarding the sharing of system resources are based on a network bandwidth shaping filter approach”, however this is taught by Bly as a system for shaping network traffic in order to control bandwidth (see paragraph 1, and fig. 3). Motivation to modify Mahalingam and Vega with Bly would be implicit to one of ordinary skill in the art at the time the invention was made in order to provide a desired rate or profile.

12. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mahalingam in view of Vega and Rietschote and in further view of Carollo.

Mahalingam, Vega, and Rietschote disclose all the limitations of claim 19 from which 23 is dependent, however they do not disclose “a device emulator for presenting a virtual NIC to each of one or more of the VMs to provide access to the plurality of physical NICs”, but this is taught by Carollo. Carollo clearly shows a virtual NIC corresponding to each VM and the virtual NIC is described in detail (see fig. 1 and paragraph 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the references with the teachings of Carollo. The motivation comes from Carollo (see paragraph 5, line 3-4), which describes using virtual NICs for communication between multiple virtual machines that are using common physical components (NICs).

13. Claims 31-35 and 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Macchiano in view of Mahalingam.

Regarding claim 31, Macchiano discloses, “A method for transferring data from a VM in a virtual computer system to a computer network, the virtual computer system comprising a first physical NIC and a second physical NIC for connecting to the computer network, the method comprising: presenting a virtual NIC to the VM through

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which the VM may attempt to transfer data to the network; receiving a first set of data and a second set of data, both of which were sent by the VM to the virtual NIC for transference to the network” as a virtual machine operating system that allows VMs to communicate over a network by using virtual NICs connected to a base portion that may contain multiple NICs (see abstract, and fig. 1). Macchiano does not disclose, “and based on a load distribution algorithm, transferring the first set of data to the network through the first physical NIC and transferring the second set of data to the network through the second physical NIC” however this is taught by Mahalingam. Mahalingam teaches a computer system having a first and second physical NIC (see fig. 1) and when data is received from the computer system to load share according to an algorithm by distributing the data across the NICs (see column 3, lines 53-55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method and system of Macchiano’s invention by having multiple physical NICs in the computer transfer the data simultaneously according to a load distribution algorithm. The motivation to combine is laid out in Mahalingam as avoiding downtime and decreasing network load. Also the benefits of link aggregation are common knowledge to one skilled in the art as set out by IEEE 802.3ad.

Regarding claim 32, Mahalingam specifically teaches “wherein the load distribution algorithm is a load-balancing algorithm” by using a round-robin mechanism (see column 10, lines 8-10). The motivation to combine is the same as set forth in the rejection of claim 31.

Regarding claim 33, Mahalingam specifically teaches “wherein the load-balancing algorithm implements a round-robin function” by using a round-robin mechanism (see column 10, lines 8-10). The motivation to combine is the same as set forth in the rejection of claim 31. The motivation to combine is the same as set forth in the rejection of claim 31.

Regarding claim 34, Mahalingam discloses, “wherein the load-balancing algorithm is based on a pending data transfer load for each of the first and second physical NICs” as a system that selects a NIC based on its load compared to the load of other NICs (see column 15, lines 30-35). The motivation to combine is the same as set forth in the rejection of claim 31.

Regarding claim 35, Mahalingam discloses, “wherein the load distribution algorithm is based on NIC management information” as a system that chooses which NICs to use based on an algorithm that includes NIC load information (see column 15, lines 30-35). NIC load information is defined by the present invention as NIC management information, thus since Mahalingam uses NIC load information, it necessarily uses NIC management information. The motivation to combine Macchiano and Mahalingam is the same as set forth in the rejection of claim 31.

Regarding claim 38, Macchiano discloses, "A method for transferring data from a VM in a virtual computer system to a computer network, the virtual computer system comprising a first physical NIC and a second physical NIC for connecting to the computer network, the method comprising: presenting a virtual NIC to the VM through which the VM may attempt to transfer data to the network; receiving a plurality of data, which were sent by the VM to the virtual NIC for transference to the network" as a virtual machine operating system that allows VMs to communicate over a network by using virtual NICs connected to a base portion that may contain multiple NICs (see abstract, and fig. 1). Macchiano does not disclose, "transferring each of the plurality of data to the network through either the first physical NIC or the second physical NIC, wherein if the first physical NIC is not available for use, the data are transferred to the network over the second physical NIC, and if the second physical NIC is not available for use, the data are transferred to the network over the first physical NIC" however this is taught by Mahalingam. Mahalingam teaches a computer system having a first and second physical NIC (see fig. 1) and when data is received from the computer system to send the data using the first physical NIC unless it is failing, when this occurs the system fails-over and the data is sent using the second physical NIC (see column 3, lines 60-66).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method and system of Macchiano's invention by having multiple physical NICs in the computer to transfer the data in case one of the NICs fails. The motivation to combine is laid out in Mahalingam as avoiding downtime. Also the

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benefits of redundancy and fault tolerance in computer systems are common knowledge.

Regarding claim 39, Mahalingam clearly discloses "wherein if both the first physical NIC is available for use and the second physical NIC is available for use, the data are transferred to the network using a physical NIC that is determined according to a load distribution algorithm" as a system that selects a NIC from a plurality of NICs based on a load distribution algorithm.

14. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Macchiano in view of Mahalingam and in further view of Vega.

Regarding claim 36, neither Macchiano nor Mahalingam disclose using VM-specific information, however Vega teaches making a decision "based on VM-specific information" by allocating resources among multiple virtual machines running on a physical computer. Vega explicitly teaches using VM-specific information (see paragraph 15, line 5) to distribute the host computer's resources. Although Vega is directed to allocating processor time, one skilled in the art understands that a NIC is a computer resource and the same allocation methods can be used. VM-specific information may include priorities, a proportional share, or absolute capacity. The motivation to modify Mahalingam with Vega was set forth in the rejection of claim 1.

Regarding claim 37, this claim combines the limitations of claims 35 and 36, which are rejected above, and thus claim 37 is rejected under similar rationale. The motivation to modify claim 35 with the teachings of Vega would come from ordinary skill in the art. Generally the more information you have to base a decision the better a decision you can make, thus it would have been obvious to use NIC information and VM information in the load distribution algorithm if this information is available, instead of only using one or the other.

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Costa-Robles et al. US 2002/0143842 A1.

Russell US 2003/0069939 A1.

Chang et al. US 2003/0163523 A1.

Lim et al. US Pat. 6,795,966 B1.

Armstrong et al. US 2004/0215858 A1.

Nelson et al. US Pat. 6,961,941 B1.

Ecoleston et al. US Pat. 7,111,086 B1.

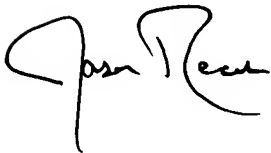
Bailey et al. US Pat. 7,134,052 B1.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Recek whose telephone number is (571) 270-1975. The examiner can normally be reached on Mon - Thurs 7:30am-5:00pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frantz Coby can be reached on (571) 272-4017. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Jason Recek

5/31/07

  
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**PRIMARY EXAMINER**